TEST REPORT

For

Shenzhen Huopingguo Technology Co., LTD.

Electric bike

Model No.: C91, C93, C93 mini, C94, C99, C31, C34, D31

Prepared for	:	Shenzhen Huopingguo Technology Co., LTD.
Address	:	6F building A 58# 2nd industrial Area Houting Shajin Bao'an, Shenzhen China
Prepared by	:	Guangdong Lintek Certification Group Co., Ltd.
Address	:	302, Building B, Xunli Science and Technology Park, No.36 Zhangge Road, Fucheng Street, Longhua District, Shenzhen, Guangdong Province, China
Date of receipt of test sample	:	Jan. 05, 2023
Serial number :	:	Prototype
Date of Test	:	Jan. 05, 2023 - Feb. 03, 2023
Date of Report	:	Feb. 03, 2023

CE

TEST REPORT		
Report Reference No.....	:	LTR23010510S02
Tested by (+ signature)	:	Vinci Yao
Approved by (+ signature)	:	Peter Zhu
Approved by (+ signature)	:	Maarten Hou
Date Of Issue	:	Feb.02, 2023
Testing Laboratory Name	:	**Guangdong Lintek Certification Group Co., Ltd.**
Address.....	:	302, Building B, Xunli Science and Technology Park, No.36 Zhangge Road, Fucheng Street, Longhua District, Shenzhen, Guangdong Province, China
Testing Location/ Procedure.....	:	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name	:	**Shenzhen Huopingguo Technology Co., LTD.**
Address.....	:	6F building A 58# 2nd industrial Area Houting Shajin Bao'an, Shenzhen China
Test Specification:		
Stan dard.....	:	EN 15194:2017
Test Report Form No.	:	EN 15194
TRF Originator	:	Guangdong Lintek Certification Group Co., Ltd.
Master TRF	:	Dated 2020-03

Test Item Description.....	**:**	Electric bike
Trade Mark	:	N/A
Model/TypeReference.....	:	C91, C93, C93 mini, C94, C99, C31, C34, D31
Ratings.....	:	54.6Vd.c. 2A from adapter
Result	**:**	Positive

TEST REPORT

Test Report No. : LTR23010510S01	Feb.02, 2023 Date of issue

Type / Model.....	:	C91, C93, C93 mini, C94, C99, C31, C34, D31
EUT.....	:	Electric bike
Applicant.....	**:**	Shenzhen Huopingguo Technology Co., LTD.
Address.....	:	6F building A 58# 2nd industrial Area Houting Shajin Bao'an, Shenzhen China
Manufacturer.....	**:**	Shenzhen Huopingguo Technology Co., LTD.
Address.....	:	6F building A 58# 2nd industrial Area Houting Shajin Bao'an, Shenzhen China
Factory.....	**:**	Shenzhen Huopingguo Technology Co., LTD.
Address.....	:	6F building A 58# 2nd industrial Area Houting Shajin Bao'an, Shenzhen China

Test Result according to the standards on page 6:	**Pass**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Test Conducted:

I. EN 15194:2017 Cycles -Electrically Power Assisted Cycles – EPAC Bicycles

1. Scope

This European Standard is intended to cover electrically power assisted bicycles of a type which have a maximum continuous rated power of 0,25 kW, of which the output is progressively reduced and finally cut off as the EPAC reaches a speed of 25 km/h, or sooner, if the cyclist stops pedalling. This European Standard specifies requirements and test methods for engine power management systems, electrical circuits including the charging system for the design and assembly of electrically power assisted bicycles and sub-assemblies for systems having a rated voltage up to and including 54.6V D.C. or integrated battery charger with a nominal 100-240V A.C. input.

2. Number of Test Specimen:

1 set of fully assembled sample, 1 pc of frame, 1 pc of front fork, 1 set of handlebar and stem assembly, 1 pc of saddle, 1 pc of seat pillar, 1 set of chain wheel and crank assembly, 4 pcs of chain, 1 pc of luggage carrier & 4 pcs of bell.

3. Test Result:

Clause	Test Item	Result	Rating
4	Safety requirements and/or protective measures		P
4.1	General		P
4.2	Electrical requirements		P
4.2.1	Electric circuit		P
4.2.2	Controls and symbols		P
4.2.3	Batteries		P
4.2.3.1	Requirements		P
4.2.4	Battery charger		P
4.2.5	Electric cables and connections		P
4.2.5.1	General		P
4.2.5.2	Requirements		P
4.2.6	Wiring		P
4.2.7	Power cables and conduits		P
4.2.8	External and internal electrical connections		P
4.2.9	Moisture resistance		P
4.2.10	Mechanical strength test		P
4.2.11	Maximum speed for which the electric motor gives assistance		P
4.2.11.1	Requirements		P
4.2.12	Start-up assistance mode		P
4.2.12.1	Requirements		P
4.2.13	Power management		P
4.2.13.1	Requirements		P
4.2.14	Maximum power measurement — Measurement at the engine shaft		P
4.2.15	Electro Magnetic Compatibility		P
4.2.15.1	Emission	See EMC test results	P
4.2.15.2	Immunity	See EMC test results	P
4.2.15.3	Battery charger	See EMC test results	P
4.2.16	Failure mode		P
4.2.16.1	Requirements		P
4.2.17	Anti-tampering measure		P
4.2.17.1	General		P
4.2.17.2	Prevention of tampering of the motor		P

PClause	Test Item	Result	Rating
4.3	Mechanical requirements		P
4.3.1	General		P
4.3.1.1	Definition of brake tests		P
4.3.1.2	Definition of strength tests		P
4.3.1.3	Numbers and condition of specimens for the strength tests		P
4.3.1.4	Accuracy tolerances of test conditions for brake tests and strength tests		P
4.3.1.5	Fatigue test		P
4.3.1.6	Fatigue test for composite components		P
4.3.1.7	Plastic material test ambient temperature		P
4.3.1.8	Crack detection methods		P
4.3.2	Sharp edges		P
4.3.3	Security and strength of safety-related fasteners		P
4.3.3.1	Security of screws		P
4.3.3.2	Minimum failure torque		P
4.3.3.3	Folding bicycles mechanism		P
4.3.4	Protrusions		P
4.3.5	Brakes		P
4.3.5.1	Braking-systems		P
4.3.5.2	Hand-operated brakes		P
4.3.5.2.1	Brake-lever position		P
4.3.5.2.2	Brake-lever grip dimensions		P
4.3.5.3	Attachment of brake assembly and cable requirements		P
4.3.5.4	Brake-levers – Position of applied force		P
4.3.5.5	Brake-block and brake-pad assemblies – Safety test		P
4.3.5.6	Brake adjustment		P
4.3.5.7	Hand-operated braking-system – Strength test		P
4.3.5.7.1	Requirement		P
4.3.5.8	Back-pedal braking system – Strength test		N/A
4.3.5.9	Braking performance		P
4.3.5.9.1	General		P
4.3.5.9.2	Requirements		P
4.3.5.9.3	Linearity requirements		P
4.3.5.9.4	Ratio between wet and dry braking performance requirements		P
4.3.5.10	Brakes – Heat-resistance test		P
4.3.5.10.1	General		P
4.3.5.10.2	Requirement		P
4.3.5.11	Back-pedal brake linearity test		P
4.3.6	Steering		P
4.3.6.1	Handlebar – Dimensions		P

4.3.6.2	Handlebar grips and plugs		P
4.3.6.2.1	Requirements		P
4.3.6.3	Handlebar stem – Insertion-depth mark or positive stop		P
4.3.6.4	Handlebar stem to fork steerer – Clamping requirements		P
4.3.6.5	Steering stability		P
4.3.6.6	Steering assembly – Static strength and safety tests		P
4.3.6.6.1	Handlebar and stem assembly – Lateral bending test		P
4.3.6.6.2	Handlebar-stem – Forward bending test		P
4.3.6.6.3	Handlebar to handlebar-stem – Torsional safety test		P
4.3.6.6.4	Handlebar-stem to fork steerer – Torsional safety test		P
4.3.6.6.5	Bar-end to handlebar – Torsional safety test		P
4.3.6.7	Handlebar and stem assembly – Fatigue test		P
4.3.7	Frames		P
4.3.7.1	Suspension-frames – Special requirement		P
4.3.7.2	Frame – Impact test (falling mass)		P
4.3.7.3	Frame and front fork assembly – Impact test (falling frame)		P
4.3.7.4	Frame – Fatigue test with pedalling forces		P
4.3.7.5	Frame – Fatigue test with horizontal forces		P
4.3.7.6	Frame – Fatigue test with a vertical force		P
4.3.8	Front fork		P
4.3.8.1	General		P
4.3.8.2	Means of location of the axle and wheel retention		P
4.3.8.3	Suspension-forks – Special requirements		P
4.3.8.3.1	Tyre-clearance test		P
4.3.8.3.2	Tensile test		P
4.3.8.4	Front fork – Static bending test		P
4.3.8.5	Front fork – Rearward impact test		P
4.3.8.5.1	Forks made entirely of metal		P
4.3.8.5.2	Forks which have composite parts		N/A
4.3.8.6	Front fork – Bending fatigue test plus rearward impact test		P
4.3.8.6.1	Requirement		P
4.3.8.7	Forks intended for use with hub- or disc-brakes		P

4.3.8.8	Tensile test for a non-welded fork		P
4.3.9	Wheels and wheel/tyre assembly		P
4.3.9.1	Wheels/tyre assembly – Concentricity tolerance and lateral tolerance		P
4.3.9.2	Wheel/tyre assembly – Clearance		P
4.3.9.3	Wheel/tyre assembly – Static strength test		P
4.3.9.4	Wheels – Wheel retention		P
4.3.9.5	Wheels – Quick-release devices – Operating features		P
4.3.10	Rims, tyres and tubes		P
4.3.10.1	General		P
4.3.10.2	Tyre inflation pressure		P
4.3.10.3	Tyre and rim compatibility		P
4.3.10.4	Rim-wear		P
4.3.10.5	Greenhouse effect test for composite wheels		P
4.3.11	Front mudguard		P
4.3.12	Pedals and pedal/crank drive system		P
4.3.12.1	Pedal tread		P
4.3.12.2	Pedal clearance		P
4.3.12.3	Pedal – Static strength test		P
4.3.12.4	Pedal – Impact test		P
4.3.12.5	Pedal – Dynamic durability test		P
4.3.12.6	Drive-system – Static strength test		P
4.3.12.7	Crank assembly – Fatigue test		P
4.3.13	Drive-chain and drive belt		P
4.3.13.1	Drive-chain		P
4.3.13.2	Drive belt		N/A
4.3.14	Chain-wheel and belt-drive protective device		P
4.3.15	Saddles and seat-posts		P
4.3.15.1	Limiting dimensions		P
4.3.15.2	Seat-post – Insertion-depth mark or positive stop		P
4.3.15.3	Saddle/seat-post – Safety test		P
4.3.15.4	Saddle – Static strength test		P
4.3.15.5	Saddle and seat-post clamp – Fatigue test		P
4.3.15.6	Seat-post – Fatigue test		P
4.3.16	Spoke protector		P
4.3.17	Luggage carriers		P
4.3.18	Road-test of a fully-assembled EPAC		P
4.3.18.1	Requirements		P
4.3.19	Lighting systems and reflectors		P
4.3.19.1	General		
4.3.19.2	Wiring harness		P
4.3.19.3	Lighting systems		P

4.3.19.4	Reflectors		P
4.3.20	Warning device		P
4.3.21	Thermal hazards		N/A
4.3.22	Performance levels (PLrs) for control system of EPACs		P
4.4	List of significant hazards		P
5	Marking, labelling		P
5.1	Requirement		P
5.2	Durability test		P
5.2.1	Requirement		P
6	Instruction for use		P

Note: N/A means not applicable.

Remark:

1. The contour of submitted rim on bicycle was beyond the catalog of ISO5775-2 for rims. So ISO5775: bicycle tyres and rims were not conducted as per the client's requirement, any problems caused by substitution of tyre and rim will be the manufacturer's responsibility.

II. ISO 9633:2001: Cycle Chains-Characteristics and test methods

1. Number of Test Specimen: 4 pieces
2. Test Result: details shown as following table:

Clause	Test Item	Result	Rating
4	Cycle chains		
4.1	Designation		P
4.2	Dimension		
4.3	Tensile testing *≥8000 N*	Broken force: 8170N	P
4.4	Push-out force *≥780 N*		P
4.5	Pre-loading		
4.6	Length accuracy *The measured length shall be 0 % to 0.15 % of nominal length for chain 081 C and -0.08 % to 0.15 % of nominal length for chain 082 C.*	Length accuracy: 0.10 %	P
4.7	Marking		P
5	Determination of twist		P
5.1	Visual detection of twist		P
5.2	Twist measuring *-15°≤a≤ +15°* *-0.17 ≤γ≤ +0.17*	a=6° γ=0.05	P
6	Determination of lateral deviation		P
6.1	Visual detection of lateral deviation		P
6.2	Lateral deviation test		P
7	Detection of a stiff link		P
8	Determination of side bow *40 mm≤F≤120 mm*	Side Bow: 85 mm	P

ISO chain number	Chain structure	Dimension	d1 max.	b1 min.	d2 max	d3 min.	h2 max	h3 max.	b3-b2 min.	b4 max
082C	Type II	Standard	7.75	2.38	3.66	3.69	8.7	8.7	0.05	7.4
		Actual dimension	7.71	2.45	3.51	3.76	8.4	8.5	0.08	7.1
		Result	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass

III. BS EN ISO 11243:2016 Bicycles — Accessories for bicycles — Luggage carriers

1. Number of Test Specimen : 2 pieces
2. Type: Normal rear luggage carriers
3. Test Result: details shown as following table:

Clause	Test Item	Result	Rating
5.3	Sharp edges		P
5.4	Security of safety-related fasteners		P
5.4.1	Security of screws		P
5.4.2	Minimum failure torque		P
5.6	Dimensions *Platform width: 120 mm -175 mm*		N/A
5.7	Protrusions		P
5.8	Assembly		P
5.9	Rear luggage carriers – Provision for lighting		P
5.10	Strength under high and low temperature		N/A
5.11	Dynamic load tests		P
5.11.3	Vertical test *Test frequency: 7 Hz*		P
5.11.4	Lateral test *Test frequency: 1 Hz*		P
5.12	Static load test – Vertical load *Permanent deformation ≤ 5 mm*	Permanent deformation: 2 mm	P
5.13	Static load test – Lateral load *Permanent deformation ≤ 5 mm Maximum deflection under load Rear luggage carrier ≤ 15 mm Front luggage carrier ≤ 10 mm*	Permanent deformation: 7mm Maximum deflection under load: 2mm	P
6	Marking		P
7	Instructions		P

IV. ISO 7636: Bells for bicycles and mopeds -Technical specifications

1. Number of Test Specimen: 4 pcs
2. Category: I
3. Test conditions: Ambient noise level: 5 dB (A) Wind Speed: 0 m/s Environment Temperature: 25 °C
4. Test Requirements:

Classfication	Category I: Bells for bicycles	75 dB(A)
	Category II: Bells for mopeds	85 dB(A)

5. Test Measurement:
a) The test results in following table were measured when received.

Unit: dB (A)

Sample Sequence	A	B	C	D
1	92.1 db	87.4 db	91.0 db	91.4 db
2	90.5 db	89.5 db	89.3 db	89.8 db
3	89.1 db	89.8 db	87.6 db	90.2 db
4	91.6 db	90.1 db	88.7 db	91.2 db
5	89.5 db	86.2 db	90.2 db	90.3 db
Rating	P	P	P	P

Sample Sequence	A	B	C	D
1	91.0 db	89.3 db	91.2 db	90.5 db
2	90.2 db	91.5 db	89.0 db	89.5 db
3	90.3 db	90.1 db	91.3 db	90.1 db
4	89.8 db	89.5 db	92.1 db	90.4 db
5	91.2 db	88.4 db	90.2 db	89.7 db
Rating	P	P	P	P
Overall Conclusion	**P**			
P criteria	At least three out of four bells shall meet the requirements.			

V. EMC TEST RESULT

Conducted Emissions on Mains Terminals, 150 kHz to 30MHz

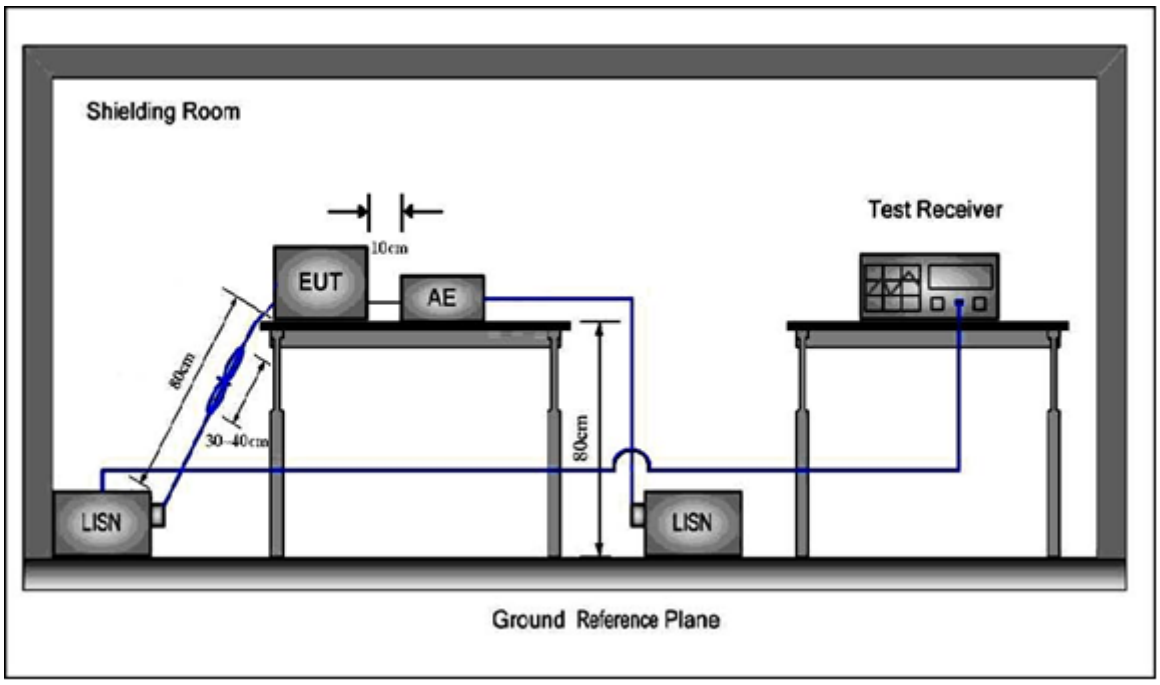
Test Requirement: EN 15194:2017
Test Method: EN 55014-1
Test voltage: AC 230V 50Hz
Frequency Range: 150KHz to 30MHz
Detector: Quasi-Peak and Average at frequency with maximum peak (9kHz resolution bandwidth)

Limit:

Frequency range MHz	**At mains terminals** dB (μV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	59 to 46
0.50 to 5	56	46
5 to 30	60	50
Note1: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.05 MHz. Note2: The lower limit is applicable at the transition frequency.		

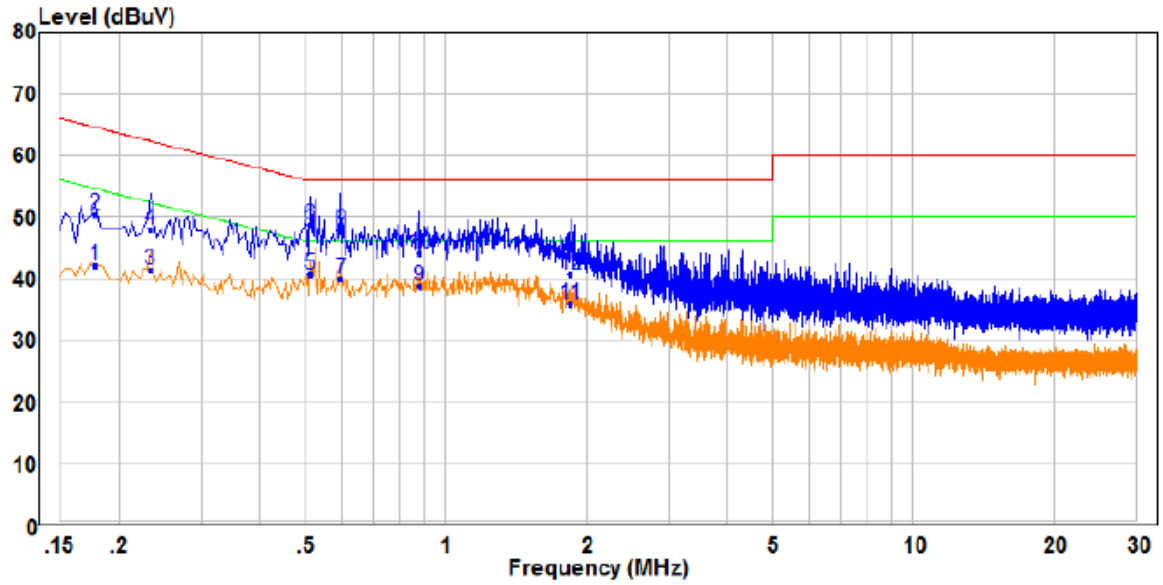
E.U.T. Operation
Operating Environment:
Temperature: 22.1 °C Humidity: 46 % RH Atmospheric Pressure: 101.5 kPa
Test mode: Charging mode
Pre-scan was performed with peak detected on all ports, Quasi-peak & average measurements were performed at the frequencies at which maximum peak emission level were detected.
Please see the attached Quasi-peak and Average test results.
Level = Read Level + LISN/ISN Factor + Cable Loss.

Test Setup and Procedure



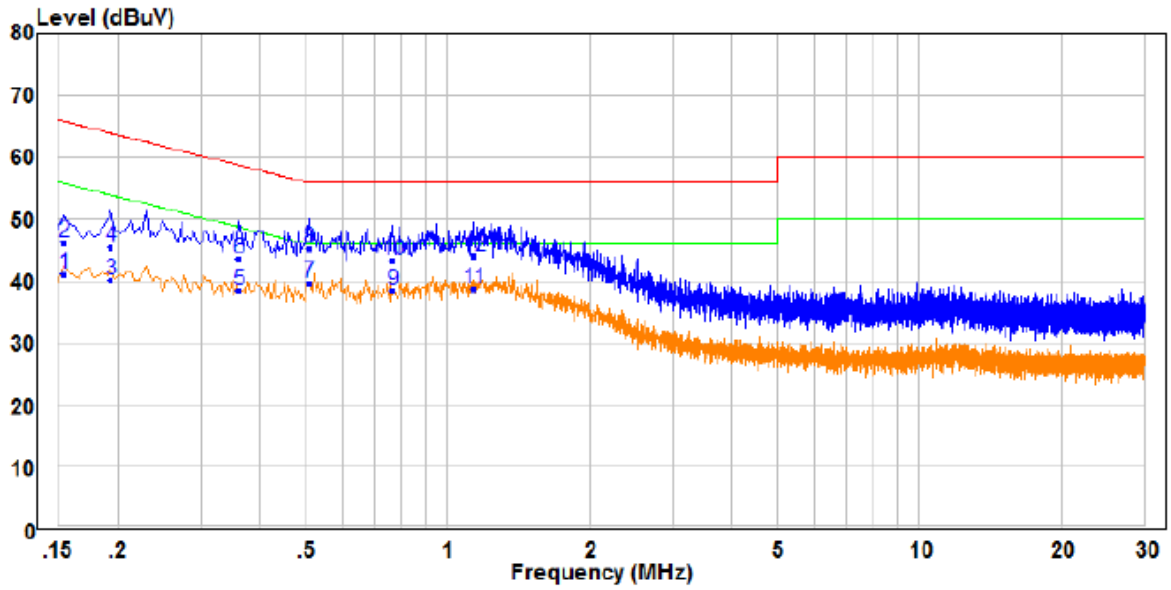
1. The mains terminal disturbance voltage was measured with the EUT in a shielded room.
2. The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 500/50μH + 50 linear impedance. The power cables of all other units of the EUT were connected to a second LISN, which was bonded to the ground reference plane in the same way as the LISN for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
3. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
4. The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN was placed 0.8m from the boundary of the unit under test and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance was between the closest points of the LISN and the EUT. The mains lead of EUT excess 0.8m was folded back and forth parallel to the lead so as to form a horizontal bundle with a length between 0.3m and 0.4m. All other units of the EUT and associated equipment were at least 0.8m from the LISN.

Measurement Data
Live Line:



		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.178	32.58	9.49	42.07	54.58	-12.51	Average	Line
2		0.178	40.84	9.49	50.33	64.58	-14.25	QP	Line
3		0.234	31.97	9.49	41.46	52.31	-10.85	Average	Line
4		0.234	38.35	9.49	47.84	62.31	-14.47	QP	Line
5	PP	0.514	31.05	9.54	40.59	46.00	-5.41	Average	Line
6	QP	0.514	39.14	9.54	48.68	56.00	-7.32	QP	Line
7		0.598	30.18	9.70	39.88	46.00	-6.12	Average	Line
8		0.598	37.95	9.70	47.65	56.00	-8.35	QP	Line
9		0.878	29.08	9.66	38.74	46.00	-7.26	Average	Line
10		0.878	34.30	9.66	43.96	56.00	-12.04	QP	Line
11		1.846	26.14	9.53	35.67	46.00	-10.33	Average	Line
12		1.846	31.20	9.53	40.73	56.00	-15.27	QP	Line

Neutral Line:



		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.154	31.62	9.48	41.10	55.78	-14.68	Average	Neutral
2		0.154	36.65	9.48	46.13	65.78	-19.65	QP	Neutral
3		0.194	30.64	9.48	40.12	53.86	-13.74	Average	Neutral
4		0.194	36.04	9.48	45.52	63.86	-18.34	QP	Neutral
5		0.362	29.03	9.52	38.55	48.68	-10.13	Average	Neutral
6		0.362	34.03	9.52	43.55	58.68	-15.13	QP	Neutral
7	PP	0.510	30.13	9.60	39.73	46.00	-6.27	Average	Neutral
8	QP	0.510	35.71	9.60	45.31	56.00	-10.69	QP	Neutral
9		0.766	28.67	9.81	38.48	46.00	-7.52	Average	Neutral
10		0.766	33.44	9.81	43.25	56.00	-12.75	QP	Neutral
11		1.138	29.00	9.72	38.72	46.00	-7.28	Average	Neutral
12		1.138	34.38	9.72	44.10	56.00	-11.90	QP	Neutral

Test Requirement: EN 15194:2017
Test Method: EN 55014-1
Test voltage: AC 230V 50Hz
Frequency Range: 30MHz to 300MHz
Detector: Peak for pre-scan Quasi-Peak and Average at frequency with maximum peak(120kHz resolution bandwidth)
Limit: Table 2a, Columns 2&3 for household and similar appliances
Disturbance power limits for the frequency range 30 MHz to 300 MHz

Frequency range MHz	**At mains terminals** (dB (pW))	
	Quasi-peak	Average
30 to 300	45 to 55	35 to 45
Note1: The limit increases linearly with the frequency in the range 30 MHz to 300 MHz.		

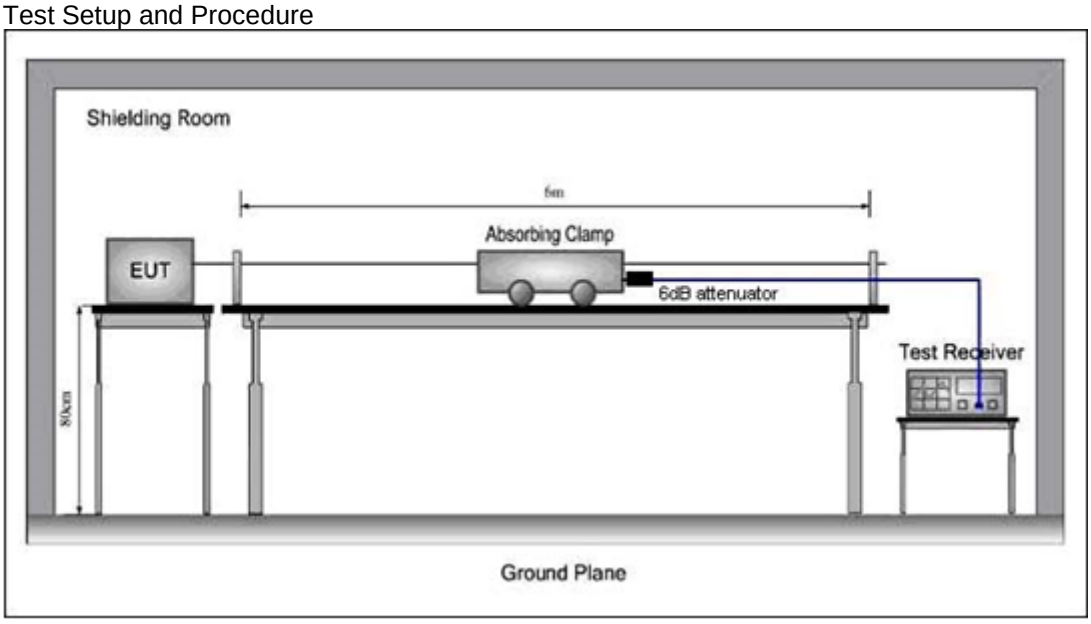
Table 2b, Columns 2&3 for household and similar appliances
Margin when performing disturbance power measurement in the frequency range 30 MHz to 300 MHz

	Frequency range MHz	**Margin** (dB)	
		Quasi-peak	Average
	200 to 300	0 to 10 dB	-
if	NOTE 1: Appliances are deemed to comply in the frequency range from 300 MHz to 1 000 MHz both of the following conditions (1) and 2)) are fulfilled: 1) all the measurement result are lower than the applicable limits (Table 2a) minus the corresponding margin (Table 2b); or the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector; 2) No clock frequency or oscillator frequency of the EUT is more than or equal to 30 MHz. NOTE 2: The measured result at a particular frequency shall be less than the relevant limit minus the corresponding margin (at that frequency).		

E.U.T. Operation
Operating Environment:
Temperature: 23.2 °C Humidity: 52 % RH Atmospheric Pressure: 101.5 kPa Test mode: Charging mode

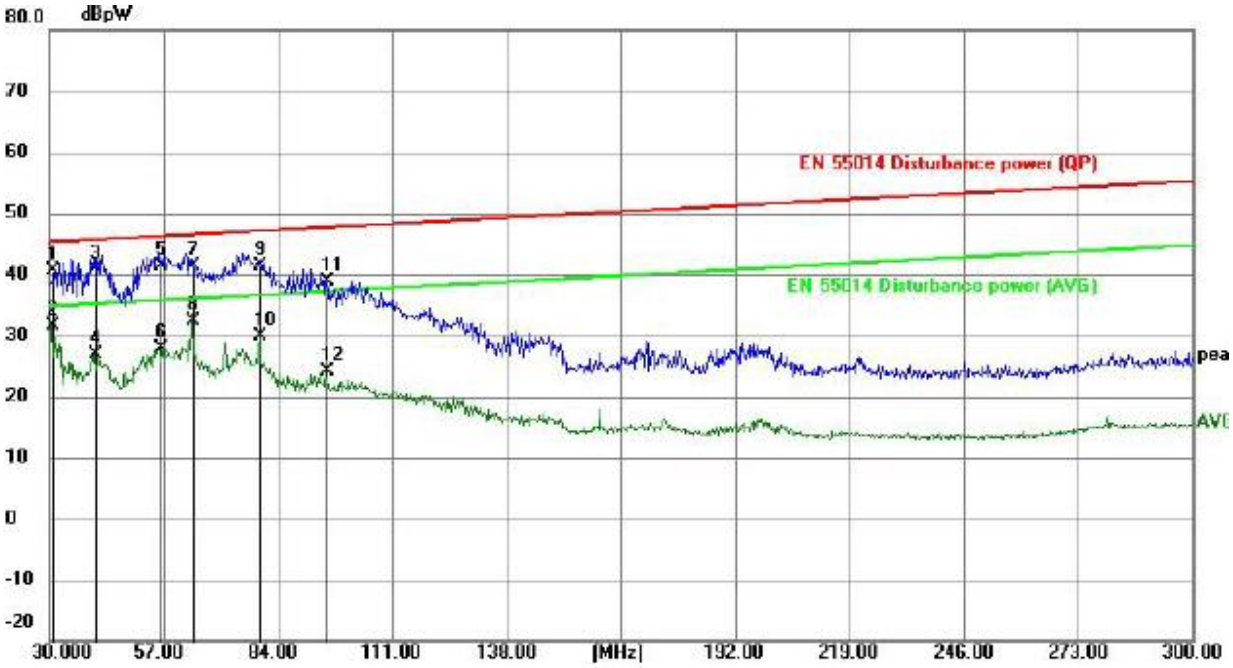
Note: t at 30MHz shall be made over a range of 0.9 to 1.1 times the rated voltage in order to e level of disturbance varies considerably with the supply voltage, compliance test at as no worse case was found. Pre-scan was performed with peak detected on all ports, Quasi-peak & average measurements were performed at the frequencies at which maximum peak emission level were detected.
Please see the attached Quasi-peak and Average test results.

Test Setup and Procedure



Level = Read Level + EM Factor + Cable Loss.

1. The disturbance power was measured with the EUT in a shielded room.
2. The distance between the clamp test set-up (the appliance, the lead to be measured and the absorbing clamp) and any other conductive objects (including persons, walls and ceiling, but excluding the floor) shall be at least 0,8 m. The appliance to be tested shall be placed on a non-metallic support table parallel to the floor. The height of the table shall be 0,1 m ± 0,025 m for appliances primarily intended to be positioned on the floor in normal use, and 0,8 m ± 0,05 m for other appliances.
3. Auxiliary leads normally extendible by the user, for instance with a loose end or leads fitted with a (by the user) easily replaceable plug or socket on one or both ends, shall in accordance with 6.2.3 be extended to a length of about 6 m. Any plug or socket which will not P through the absorbing clamp due to its size shall be removed (see 6.2.3).
4. If the auxiliary lead is permanently fixed to the appliance and to the auxiliary apparatus and:
– is shorter than 0,25 m, measurement are not to be made on these leads;
–is longer than 0,25 m but shorter than twice the length of the absorbing clamp, it shall be extended to twice the length of the absorbing clamp;
–is longer than twice the length of the absorbing clamp, measurements shall be made using the original lead.
5. The absorbing clamp was moved along the lead to obtain maximum disturbance.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBpW)	Limit (dBpW)	Margin (dB)	Detector
1	30.7200	32.51	8.09	40.60	45.03	-4.43	QP
2	30.7200	23.54	8.09	31.63	35.03	-3.40	AVG
3	40.7400	32.21	8.79	41.00	45.40	-4.40	QP
4	40.7400	18.10	8.79	26.89	35.40	-8.51	AVG
5	56.4000	32.42	8.88	41.30	45.98	-4.68	QP
6	56.4000	19.00	8.88	27.88	35.98	-8.10	AVG
7	63.7800	32.07	9.23	41.30	46.25	-4.95	QP
8	63.7800	23.27	9.23	32.50	36.25	-3.75	AVG
9	79.7400	32.94	8.56	41.50	46.84	-5.34	QP
10	79.7400	21.34	8.56	29.90	36.84	-6.94	AVG
11	95.5199	30.98	7.92	38.90	47.43	-8.53	QP
12	95.5199	16.22	7.92	24.14	37.43	-13.29	AVG

Emissions, 30MHz to 1GHz
Radiated

Test Requirement:	EN 15194:2017
Test Method:	CISPR 12: 2007(EPAC) CISPR 25: 2008(ESA)
Test voltage:	DC 54.6V
Frequency range:	30 MHz to 1GHz
Measurement Distance:	3m(for EPAC) 1m(for ESA)
Detector:	Peak for pre-scan (120 kHz resolution bandwidth) Quasi-Peak for final test (120 kHz resolution bandwidth)
Limit:	According to EN 15194:2017, Table C.1

For EPAC

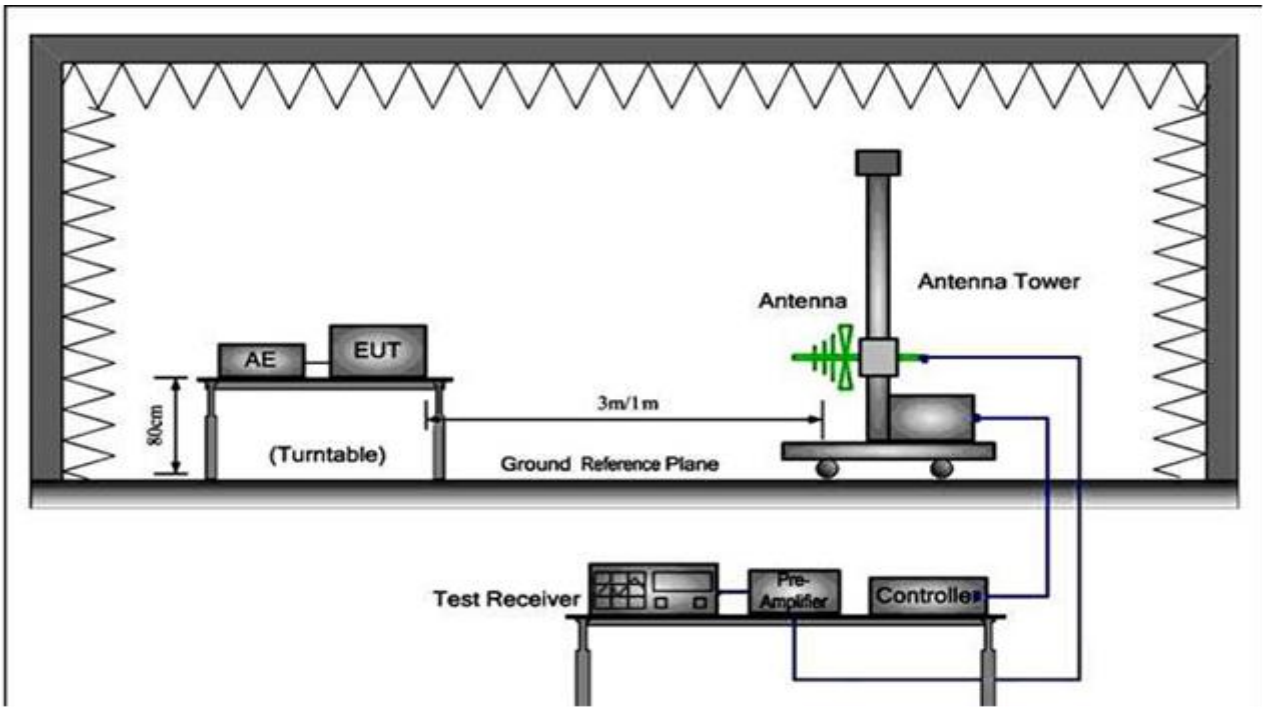
Frequency range	Quasi-peak limits with f(MHz)	Mean value limits with f(MHz)
MHz	dB (μV/m)	dB (μV/m)
30 to 75	44	34
75 to 400	44+15,13·log(f/75)	34+15,13·log(f/75)
400 to 1000	55	45
At transitional frequencies the lower limit applies.		

Limit:
For ESA

Frequency range	Quasi-peak limits with f(MHz)	Mean value limits with f(MHz)
MHz	dB (μV/m)	dB (μV/m)
30 to 75	64	54
75 to 400	54+15,13·log(f/75)	44+15,13·log(f/75)
400 to 1000	65	55
At transitional frequencies the lower limit applies.		

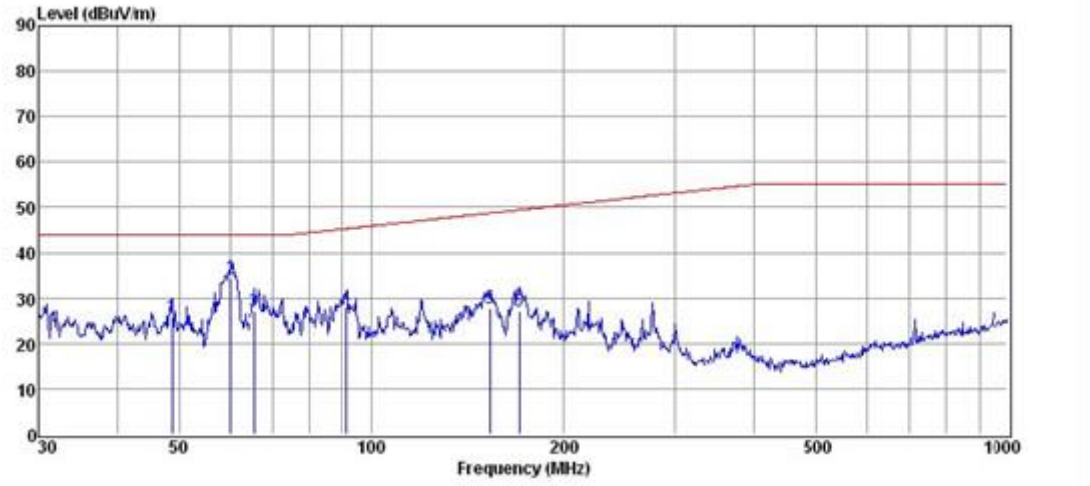
E.U.T. Operation
Operating Environment: Temperature: 23.5 °C Humidity: 52.5 % RH Atmospheric Pressure: 101.2 kPa
Test mode: Running mode
Pre-scan was performed with peak detected on all ports, Quasi-peak & average measurements were performed at the frequencies at which maximum peak emission level were detected. Please see the attached Quasi-peak and Average test results. For radiated emission: Level = Read Level + Antenna Factor + Cable

Test Setup and Procedure



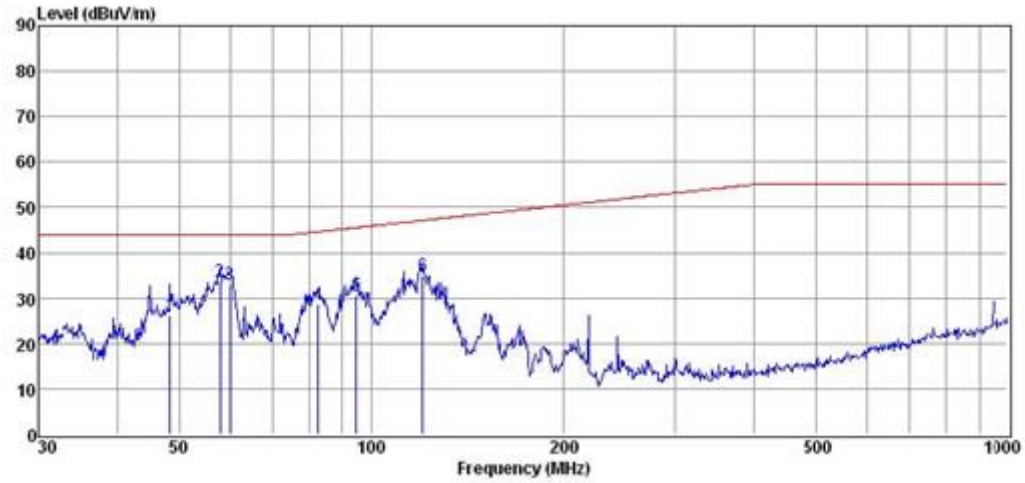
1. The radiated emissions test was conducted in a semi-anechoic chamber.
2. The EUT was connected to AC power source through a mains power outlet which was bonded to the ground reference plane; The mains cables shall drape to the ground reference plane.
3. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
4. Before final measurements of radiated emissions, a pre-scan was performed in the spectrum mode with the peak detector to find out the maximum emission spectrum signature data plots of the EUT.
5. The frequencies of maximum emission were determined in the final radiated emissions measurement, the physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency.

Measurement Data
EPAC
Horizontal: (30-1000MHz QP)



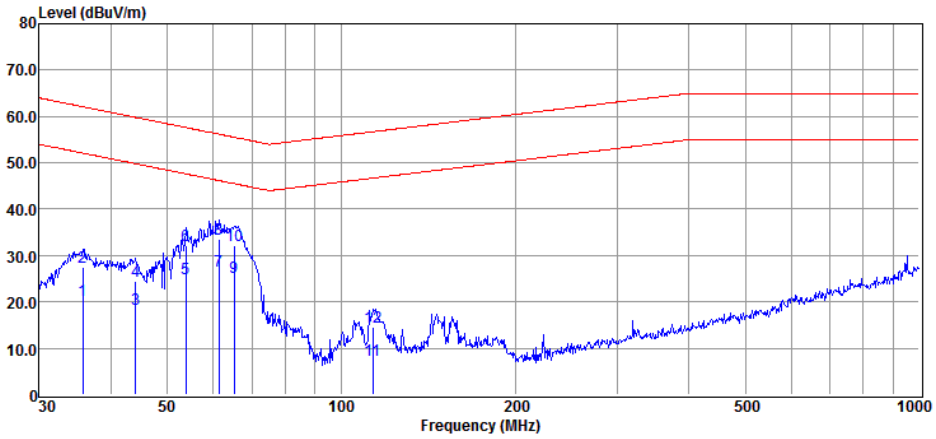
Item	Freq.	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Result Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(dBµV)	(dB/m)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	
1	36.62	37.21	12.80	24.70	0.62	26.08	44.00	-17.90	QP
2	60.04	46.22	12.22	24.70	0.70	34.35	44.00	-9.64	QP
3	65.50	39.52	11.41	24.70	0.72	27.14	44.00	-16.82	QP
4	91.52	42.22	8.62	24.70	0.92	28.18	45.31	-17.09	QP
5	153.78	37.12	12.62	24.70	1.25	27.89	36.72	-20.79	QP
6	170.81	37.20	12.22	24.60	1.32	27.32	49.41	-22.12	QP

EPAC
Vertical: (30-1000MHz QP)



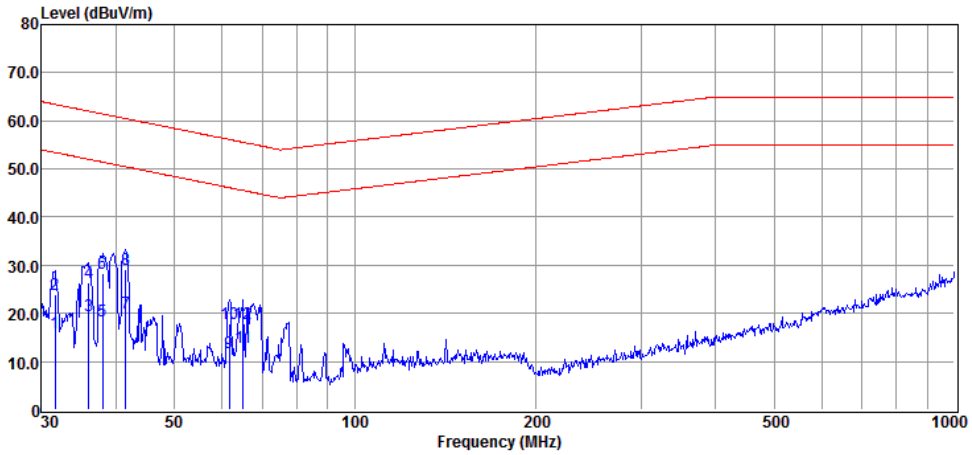
Item	Freq.	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Result Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
1	36.27	37.28	12.88	24.70	0.62	26.21	44.00	-17.72	QP
2	57.78	45.40	12.32	24.70	0.70	33.78	44.00	-10.11	QP
3	59.81	44.82	12.24	24.70	0.71	33.22	44.00	-10.81	QP
4	82.60	43.74	8.68	24.70	0.86	28.13	44.64	-15.84	QP
5	94.70	45.42	8.24	24.70	0.92	30.32	45.54	-14.32	QP
6	120.22	36.18	10.20	24.70	1.10	34.82	47.10	-12.12	QP

ESA
Horizontal: (30-300MHz QP & AV)



Item	Freq.	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Result Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(DbμV)	(Db/m)	(Db)	(Db)	(DbμV/m)	(DbμV/m)	(Db)	
1	35.72	31.92	12.62	24.70	0.51	20.40	52.09	-31.62	Average
2	35.72	38.92	12.62	24.70	0.51	27.40	62.09	-34.62	QP
3	44.10	29.51	13.11	24.70	0.56	18.49	49.79	-31.24	Average
4	44.10	35.51	13.11	24.70	0.56	24.49	59.79	-35.24	QP
5	53.84	36.82	12.22	24.70	0.62	25.02	47.61	-22.51	Average
6	53.84	43.82	12.22	24.70	0.62	32.02	57.61	-25.51	QP
7	61.30	38.64	11.93	24.70	0.71	26.61	46.19	-19.52	Average
8	61.30	45.64	11.93	24.70	0.71	33.61	56.19	-22.52	QP
9	65.30	37.71	11.41	24.70	0.72	25.20	45.50	-20.23	Average
10	65.30	44.71	11.41	24.70	0.72	32.20	55.50	-23.23	QP
11	113.29	20.31	10.72	24.70	1.10	7.41	46.71	-39.20	Average
12	113.29	27.31	10.72	24.70	1.10	14.41	56.71	-42.20	QP

ESA
Vertical: (300-1000MHz QP & AV)



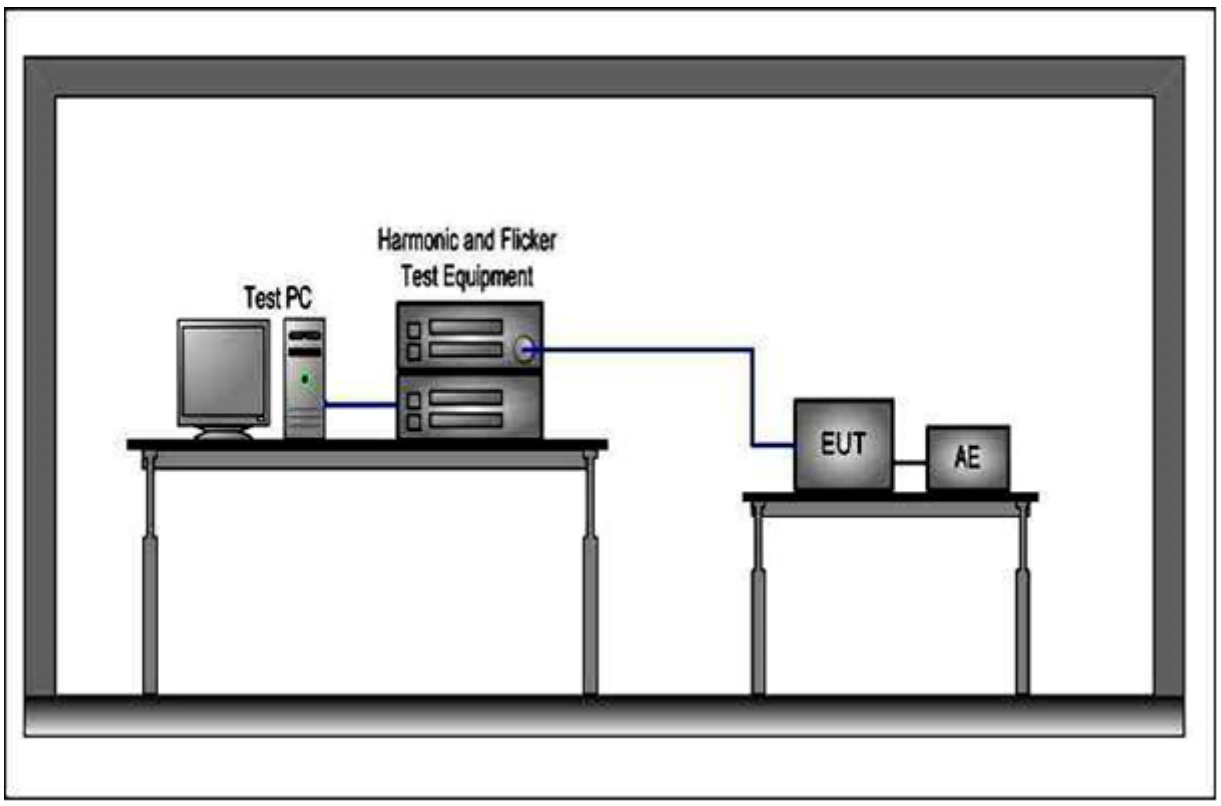
Item	Freq.	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Result Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(DbμV)	(Db/m)	(Db)	(Db)	(DbμV/m)	(DbμV/m)	(Db)	
1	31.60	27.54	12.52	24.70	0.42	15.82	53.43	-37.56	Average
2	31.60	35.54	12.52	24.70	0.42	23.82	63.43	-39.56	QP
3	36.11	30.88	12.65	24.70	0.48	19.40	52.01	-32.60	Average
4	36.11	37.88	12.65	24.70	0.48	26.40	62.01	-35.60	QP
5	37.89	29.60	12.88	24.70	0.51	18.32	51.44	-33.12	Average
6	37.89	39.60	12.88	24.70	0.51	28.32	61.44	-33.12	QP
7	41.41	31.16	13.12	24.70	0.52	20.15	50.48	-30.30	Average
8	41.41	40.16	13.12	24.70	0.52	29.15	60.48	-31.30	QP
9	61.72	23.91	11.84	24.70	0.71	11.82	46.12	-34.23	Average
10	61.72	29.91	11.84	24.70	0.71	17.82	56.12	-38.23	QP
11	65.10	25.32	11.40	24.70	0.74	12.83	45.54	-32.64	Average
12	65.10	30.32	11.40	24.70	0.74	17.83	55.54	-37.64	QP

Harmonics Test Result

Test Requirement:	EN 61000-3-2
Test Method:	EN 61000-3-2
Test voltage:	AC 230V 50Hz
Frequency Range:	100Hz to 2kHz
Measurement Time:	2.5mins
Class / Severity:	Class A

E.U.T. Operation
Operating Environment:
Temperature: 23.0 °C Humidity: 56 % RH Atmospheric Pressure: 101.1 kPa Test mode: Charging mode

Test Setup and Procedure



1. The EUT was tested with the equipment configured to its rated current.
2. The measurements were carried out under steady conditions. When a piece of EUT is brought into operation or is taken out of operation, manually or automatically, harmonic currents and power are not taken into account at first 10s following the switching event. EUT shall not be in standby mode for more than 10% of any observation period.
3. Harmonics of the fundamental current were measured using a digital power meter with an analogue output and frequency analyser which was integrated in the harmonic & flicker test system.
4. For each harmonic order, measure the 1.5 s smoothed r.m.s. harmonic current in each DFT time window and calculate the arithmetic average of the measured values from the DFT time windows, over the entire observation period. Each harmonic order, all 1.5 s smoothed r.m.s. harmonic current values and the average values for the individual harmonic currents, taken over the entire test observation period shall be less than or equal to the applicable limits.

Measurement Data

Average harmonic current results				
Hn	Ieff [A]	% of Limit	Limit [A]	Result
1	238.612E-3			
2	4.469E-3	0.414	1.08	P
3	19.409E-3	0.844	2.30	P
4	1.108E-3	0.258	430.00E-3	P
5	14.530E-3	1.275	1.14	P
6	594.983E-6	0.198	300.00E-3	P
7	14.651E-3	1.903	770.00E-3	P
8	303.158E-6	0.132	230.00E-3	P
9	9.391E-3	2.336	400.00E-3	P
10	224.459E-6	0.122	184.00E-3	P
11	5.439E-3	1.636	330.00E-3	P
12	214.511E-6	0.140	153.33E-3	P
13	2.861E-3	1.362	210.00E-3	P
14	218.360E-6	0.166	131.43E-3	P
15	2.010E-3	1.340	150.00E-3	P
16	187.536E-6	0.163	115.00E-3	P
17	1.173E-3	0.886	132.35E-3	P
18	368.934E-6	0.478	102.22E-3	P
19	693.938E-6	0.586	118.42E-3	P
20	135.413E-6	0.147	92.00E-3	P
21	805.442E-6	0.501	160.71E-3	P
22	136.097E-6	0.163	83.64E-3	P
23	626.058E-6	0.427	146.74E-3	P
24	125.013E-6	0.163	76.66E-3	P
25	459.364E-6	0.340	135.00E-3	P
26	120.259E-6	0.170	70.77E-3	P
27	442.581E-6	0.354	124.99E-3	P
28	155.521E-6	0.237	65.71E-3	P
29	184.105E-6	0.158	116.39E-3	P
30	116.502E-6	0.190	61.33E-3	P
31	201.397E-6	0.185	108.87E-3	P
32	120.873E-6	0.210	57.50E-3	P
33	210.442E-6	0.206	102.27E-3	P
34	115.000E-6	0.212	54.12E-3	P
35	136.540E-6	0.142	96.44E-3	P
36	137.437E-6	0.269	51.11E-3	P
37	193.427E-6	0.212	91.21E-3	P
38	110.799E-6	0.229	36.42E-3	P
39	127.190E-6	0.147	86.53E-3	P
40	117.380E-6	0.255	46.00E-3	P

Maximum harmonic current results				
Hn	Ieff [A]	% of Limit	Limit [A]	Result
1	251.918E-3			
2	5.252E-3	0.324	1.62	P
3	20.490E-3	0.594	3.45	P
4	1.439E-3	0.223	645.00E-3	P
5	15.144E-3	0.886	1.71	P
6	791.794E-6	0.176	450.00E-3	P
7	15.274E-3	1.322	1.15	P
8	380.623E-6	0.110	345.00E-3	P
9	9.703E-3	1.617	600.00E-3	P
10	285.263E-6	0.103	276.00E-3	P
11	5.562E-3	1.124	495.00E-3	P
12	315.260E-6	0.137	229.99E-3	P
13	2.946E-3	0.935	315.00E-3	P
14	289.755E-6	0.147	197.15E-3	P
15	2.103E-3	0.935	225.00E-3	P
16	260.210E-6	0.151	172.50E-3	P
17	1.274E-3	0.642	198.52E-3	P
18	622.592E-6	0.406	153.33E-3	P
19	797.659E-6	0.449	177.63E-3	P
20	180.205E-6	0.131	138.00E-3	P
21	908.518E-6	0.565	160.71E-3	P
22	185.261E-6	0.136	125.46E-3	P
23	714.120E-6	0.367	146.74E-3	P
24	166.226E-6	0.145	114.99E-3	P
25	520.802E-6	0.386	135.00E-3	P
26	157.175E-6	0.136	106.16E-3	P
27	539.835E-6	0.432	124.99E-3	P
28	214.444E-6	0.218	98.57E-3	P
29	251.429E-6	0.216	116.39E-3	P
30	160.318E-6	0.174	92.00E-3	P
31	251.338E-6	0.231	108.87E-3	P
32	174.715E-6	0.203	86.25E-3	P
33	278.914E-6	0.273	102.27E-3	P
34	168.093E-6	0.207	81.18E-3	P
35	176.444E-6	0.183	96.44E-3	P
36	215.093E-6	0.281	76.66E-3	P
37	282.244E-6	0.309	91.21E-3	P
38	152.601E-6	0.210	72.63E-3	P
39	172.443E-6	0.199	86.53E-3	P
40	162.498E-6	0.236	69.00E-3	P

Maximum harmonic voltage results				
Hn	Ueff [V]	Ueff [%]	Limit [%]	Result
1	230.93	100.403		
2	64.58E-3	0.028	0.2	P
3	91.39E-3	0.040	0.9	P
4	15.17E-3	0.007	0.2	P
5	26.67E-3	0.012	0.4	P
6	10.13E-3	0.004	0.2	P
7	53.08E-3	0.023	0.3	P
8	15.31E-3	0.007	0.2	P
9	40.12E-3	0.017	0.2	P
10	14.91E-3	0.006	0.2	P
11	80.99E-3	0.035	0.1	P
12	13.52E-3	0.006	0.1	P
13	15.85E-3	0.007	0.1	P
14	11.49E-3	0.005	0.1	P
15	73.88E-3	0.032	0.1	P
16	18.76E-3	0.008	0.1	P
17	27.02E-3	0.012	0.1	P
18	14.77E-3	0.006	0.1	P
19	69.27E-3	0.030	0.1	P
20	21.02E-3	0.009	0.1	P
21	43.83E-3	0.019	0.1	P
22	15.34E-3	0.007	0.1	P
23	62.06E-3	0.027	0.1	P
24	18.73E-3	0.008	0.1	P
25	49.90E-3	0.022	0.1	P
26	17.30E-3	0.008	0.1	P
27	55.12E-3	0.024	0.1	P
28	21.42E-3	0.009	0.1	P
29	55.57E-3	0.024	0.1	P
30	16.90E-3	0.007	0.1	P
31	52.98E-3	0.023	0.1	P
32	18.24E-3	0.008	0.1	P
33	53.58E-3	0.023	0.1	P
34	13.11E-3	0.006	0.1	P
35	39.73E-3	0.017	0.1	P
36	16.94E-3	0.007	0.1	P
37	51.46E-3	0.022	0.1	P
38	13.10E-3	0.006	0.1	P
39	25.64E-3	0.011	0.1	P
40	13.62E-3	0.006	0.1	P

Flicker Test Result

Test Requirement:	EN 61000-3-3
Test Method:	EN 61000-3-3
Test voltage:	AC 230V 50Hz
Measurement Time:	120 mins
Class / Severity:	Clause 5 of EN 61000-3-3

E.U.T. Operation

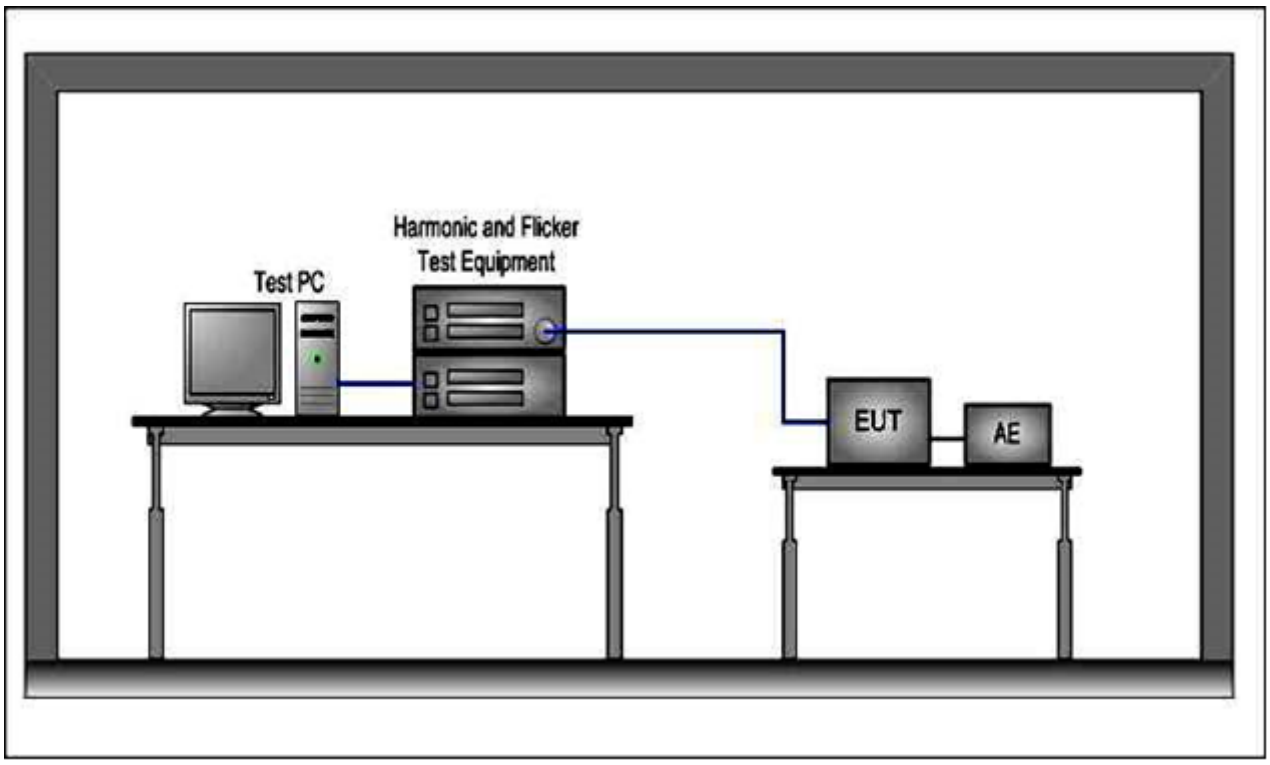
Operating Environment:

Temperature: 23 °C Humidity: 56 % RH Atmospheric Pressure: 101.1 kPa

Test mode: Charging mode

Note: “Pst and Plt requirements shall not be applied to voltage changes caused by manual switching. The limits shall not be applied to voltage changes associated with emergency switching or emergency interruptions.“ Please also refer to Annex A (Application of limits and type test conditions) for details in EN 61000-3-3.

Test Setup and Procedure



1. The test supply voltage (open-circuit voltage) was the rated voltage of the EUT. The test voltage was maintained within ±2 % of the nominal value. The frequency was 50 Hz ±0.5 %.
2. The voltage fluctuations and flicker were measured at the supply terminals of the EUT.
3. The observation period, Tp, for the assessment of flicker values by flicker measurement, flicker simulation, or analytical method was:

for Pst, Tp = 10 min;

for Plt, Tp = 2 h. The observation period included that part of the whole operation cycle in which the EUT produces the most unfavorable sequence of voltage changes.

Measurement Data
Maximum Flicker results

	EUT values	Limit	Result
Pst	0.036	1.00	P
Plt	0.036	0.65	P
dc [%]	0.000	3.30	P
dmax [%]	0.082	4.00	P
dt [s]	0.000	0.50	P

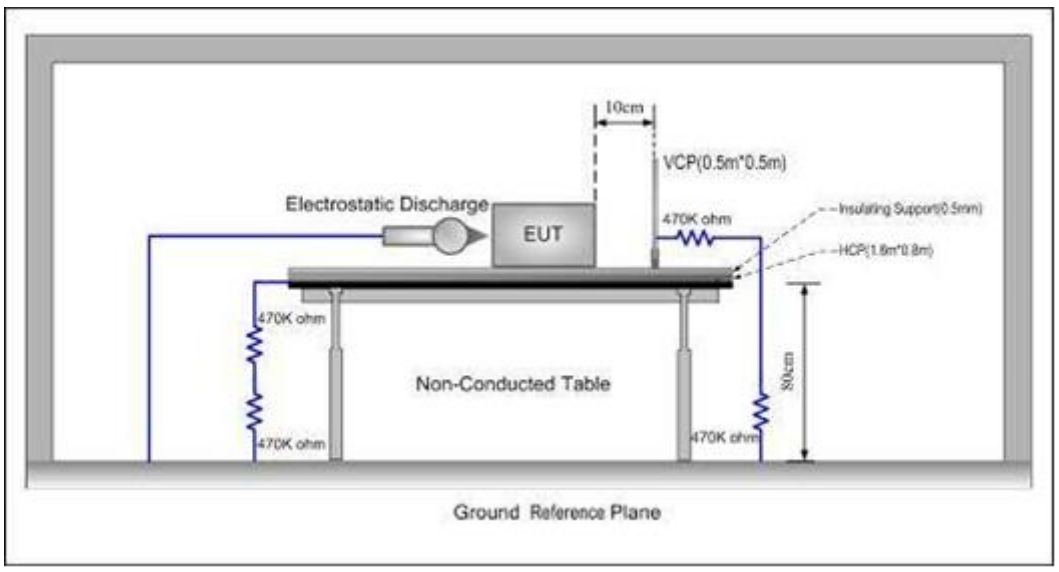
Electromagnetic Susceptibility Test Results

ESD

Test Requirement:	EN 15194:2017	
Test Method:	EN 61000-4-2	
Power Supply:	AC 230V 50Hz for adapter; DC 36V for EPAC & ESA	
Discharge Impedance:	330 Ω / 150 pF	
Discharge Voltage:	Air Discharge:	8 kV
	Contact Discharge:	4 kV
	HCP:	4 kV
	VCP:	4 kV
Polarity:	Positive & Negative	
Number of Discharge:	Minimum 10 times at each test point	
Discharge Mode:	Single Discharge	
Discharge Period:	1 second minimum	

E.U.T. Operation
Operating Environment:
Temperature: 23 °C Humidity: 56 % RH Atmospheric Pressure: 101.1 kPa
Test mode: Running mode & 90% start up assistance mode & 90% maximum assistance speed mode & Standstill mode for EPAC, Running mode & Standby mode for ESA, Charging mode for Battery charger

Test Setup and Procedure



1. Contact discharge was applied only to conductive surfaces of the EUT. Air discharge was applied only to non-conducted surfaces of the EUT.
2. The EUT was put on a 0.8m high wooden table for table-top equipment or 0.1m high for floor standing equipment standing on the ground reference plane (GRP).
3. A horizontal coupling plane(HCP) 1.6m by 0.8m in size was placed on the table, and the EUT with its cables were isolated from the HCP by an insulating support thick than 0.5mm. The VCP 0.5m by 0.5m in size while HCP were constructed from the same material type and thickness as that of the GRP, and connected to the GRP via a 470kO resistor at each end. The distance between EUT and any of the other metallic surface excepted the GRP, HCP and VCP was greater than 1m.
4. During the contact discharges, the tip of the discharge electrode was touch the EUT before the discharge switch is operated. During the air discharges, the round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT.
5. After each discharge, the ESD generator was removed from the EUT, the generator is then retriggered for a new single discharge. For ungrounded product, a discharge cable with two resistances were used after each discharge to remove remnant electrostatic voltage. 10 times of each polarity single discharge were applied to HCP and VCP.

Test Results
Direct Application Test Results
Observations: Test Point:
1. All insulated enclosure & seams.
2. All accessible metal parts of the enclosure

Direct Application				Test Results	
Discharge Level (kV)	Polarity (+/-)	Test Point	Test Mode	Contact Discharge	Air Discharge
8	+/	1	Running mode & 90% start up assistance	N/A	A
4	+/	2	mode & 90% maximum assistance speed mode & Standstill mode for EPAC, Running mode & Standby mode for ESA, Charging mode for Battery charger	A	N/A

Indirect Application Test Results
Observations: Test Point:
1. All sides.

Indirect Application				Test Results	
Discharge Level (kV)	Polarity (+/-)	Test Point	Test Mode	Horizontal Coupling	Vertical Coupling
4	+/	1	Running mode & 90% start up assistance mode & 90% maximum assistance speed mode & Standstill mode for EPAC, Running mode & Standby mode for ESA, Charging mode for Battery charger	A	A

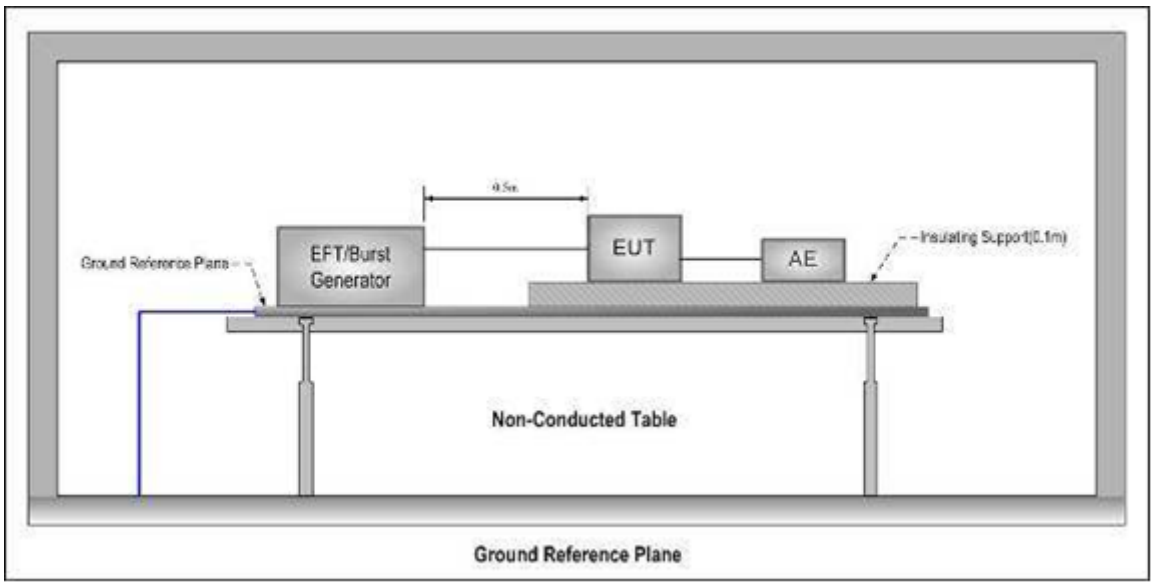
Results:
A: During test, no degradation in the performance of the EUT was observed; After test, no degradation in the performance of the EUT was observed.
N/A: Not applicable (floor mounted EUT or not requested by Standard).

Electrical Fast Transients (EFT)

Test Requirement: EN 15194:2017
Test Method: EN 61000-4-4
Power Supply: AC 230V 50Hz
Test Level: 1.0kV on AC
Polarity: Positive & Negative
Repetition Frequency: 5kHz
Burst Duration: 300ms
Test Duration: 2 minute per level & polarity

E.U.T. Operation
Operating Environment:
Temperature: 23 °C Humidity: 56 %RH Atmospheric Pressure: 101.1 kPa
Test mode: Charging mode

Test Setup and Procedure



1. The EUT was placed on a ground reference plane(GRP) insulated by an insulating support 0,1 m thick and the GRP was placed on a 0.8m high wooden table for table-top equipment. For floor standing equipment, the EUT was placed on a 0.1m high wooden support above the GRP.
2. The GRP shall project beyond the EUT and the clamp by at least 0.1m on all sides. The distance between the EUT and any other of the metallic surface except the GRP was greater than 0.5m. All cables to the EUT was placed on the insulation support 0.1m above GRP. Cables not subject to EFT was routed as far as possible from cable under test to minimize the coupling between the cables.
3. The length of signal and power cable between the EUT and EFT generator was 0.5m. If the cable is a non-detachable supply cable more than 0.5m, the excess length of this cable shall be folded to avoid a flat coil and situated at a distance of 0.1m above the GRP.

The EUT was conducted the below specified level voltage test for line to neutral or line to neutral to earth(for clamp coupling is for the signal line), 120 seconds duration. If the equipment contains identical ports, only one was tested; multi conductor cables, such as a 50-pair telecommunication cable, was tested as a single cable. Cables did not be split or divided into groups of conductors for this test; interface ports, which were intended by the manufacturer to be connected to data cables not longer than 3 m, did not be tested.

Test Results On AC Supply

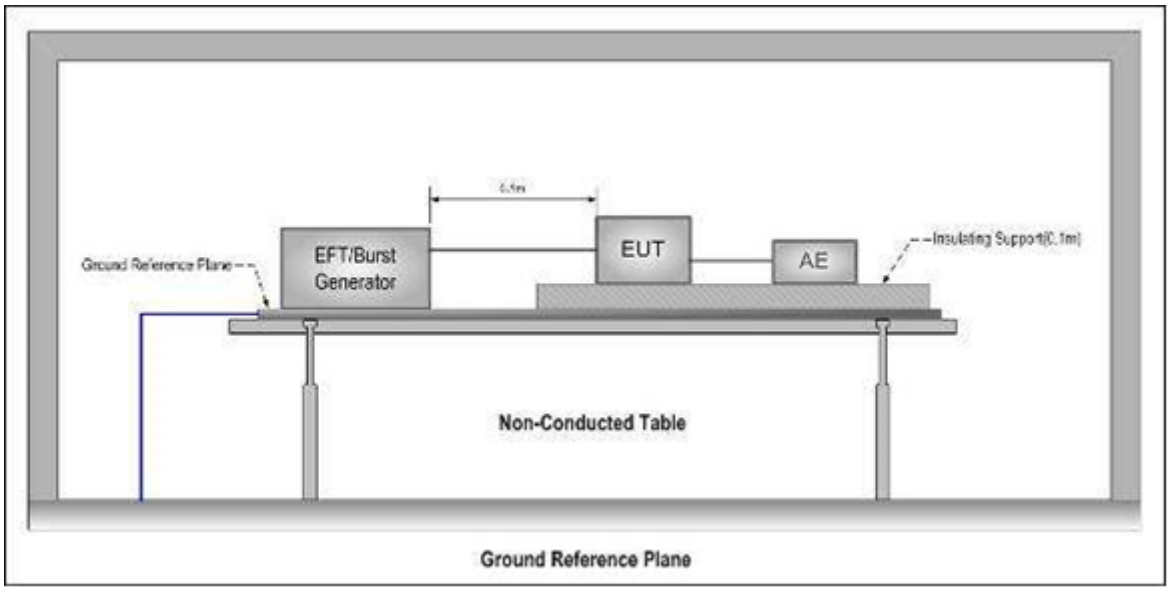
Lead under Test	Level (±kV)	Coupling Direct/Clamp	Test mode	Observations (Performance Criterion)
Live + Neutral + Earth	± 1.0	Direct	Charging mode	(A)

A: During test, no degradation in the performance of the EUT was observed; After test, no degradation in the performance of the EUT was observed.

Surge
Test Requirement: EN 15194:2017
Test Method: EN 61000-4-5
Power Supply: AC 230V 50Hz
Test Level: ±1.0 kV Live to Neutral
±2.0 kV Live, Neutral to Earth
Polarity: Positive & Negative
Generator source impedance: Line to Line:20, Line to PE:12
Trigger Mode: Internal
No. of surges: 5 positive at 90°, 5 negative at 270°.

E.U.T. Operation
Operating Environment:
Temperature: 23 °C Humidity: 56 % RH Atmospheric Pressure: 101.1 kPa
Test mode: Charging mode

Test Setup and Procedure



1. The EUT was placed on a ground reference plane(GRP) insulated by an insulating support 0,1 m thick and the GRP was placed on a 0.8m high wooden table for table-top equipment. For floor standing equipment, the EUT was placed on a 0.1m high wooden support above the GRP.
2. The 1,2/50 μs surge was to be applied to the EUT power supply terminals via the capacitive coupling network .Decoupling networks were required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines and to provide sufficient decoupling impedance to the surge wave so that the specified wave may be applied on the lines under test.
3. The power cord between the EUT and the coupling/decoupling network do not exceed 2m in length. The interconnection line between the EUT and the coupling/ decoupling network shall not exceed 2 m in length.
4. The EUT was conducted 1kV Test voltage: for line to line and line to neutral and conducted 2kV Test voltage: for line to earth and neutral to earth, five positive pulses and five negative pulses each at 90°, 270°for AC power ports and five positive pulses and five negative surge pulses for DC power ports. The test levels were applied on the EUT with a 20 generator source impedance for power supply terminals and 400 output impedance for interconnection lines. The tests were done at repetition rate 1 per minute.

Test Results:

Pulse No	Line-Line	Level (kV)	Surge Interval	Phase (deg)	Test Mode	Observation (Performance Criterion)
1–5	L-N	+1	60s	90°	Charging mode	(A)
6–10	L-N	-1	60s	270°		(A)
11–15	L-PE	+2	60s	90°		(A)
16–20	L-PE	-2	60s	270°		(A)
21–25	N-PE	+2	60s	90°		(A)
26–30	N-PE	-2	60s	270°		(A)

A: During test, no degradation in the performance of the EUT was observed; After test, no degradation in the performance of the EUT was observed.

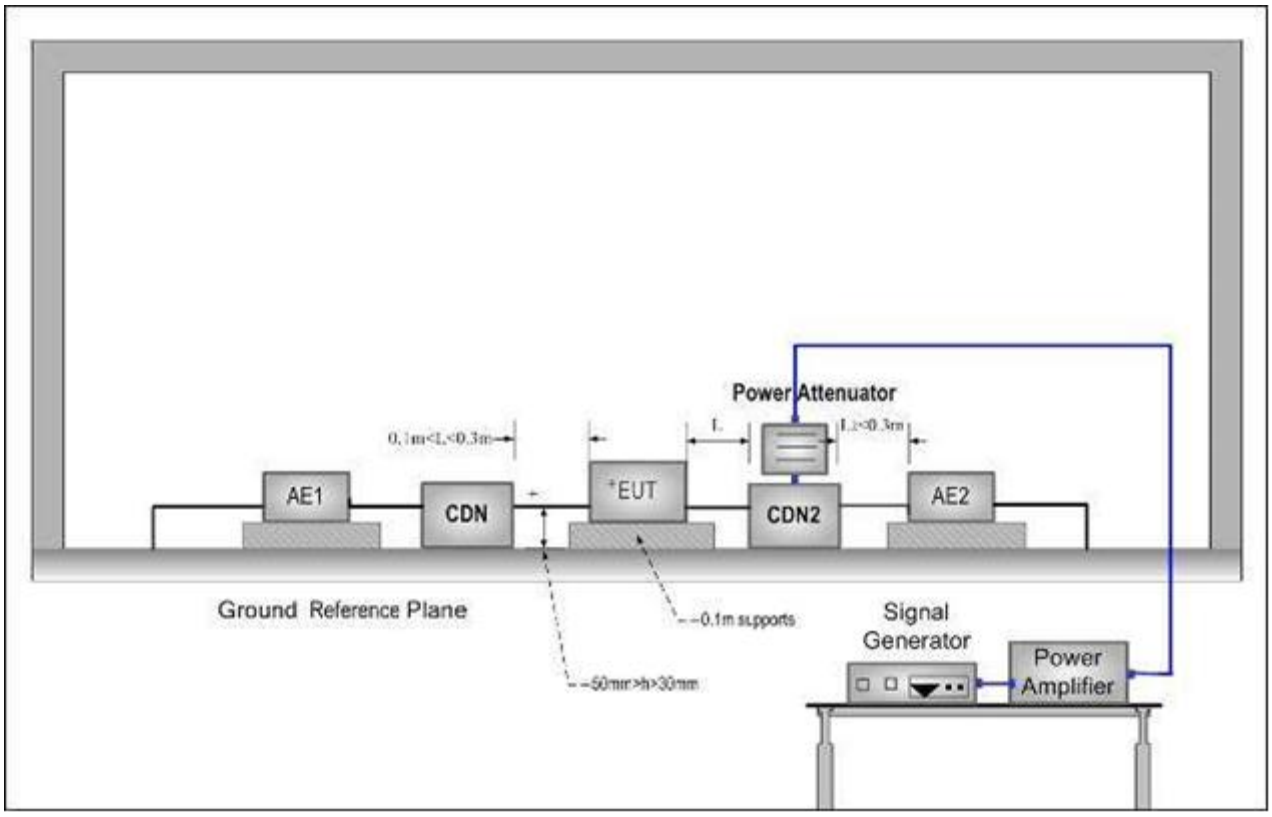
Conducted Immunity 0.15 MHz to 230 MHz

Test Requirement: EN 15194:2017
Test Method: EN 61000-4-6
Power Supply: AC 230V 50Hz
Frequency Range: 0.15 MHz to 230 MHz
Test level: 3V r.m.s on AC Ports (unmodulated emf into 150 Ω)
Modulation: 80%, 1kHz Amplitude Modulation

E.U.T. Operation

Operating Environment:
Temperature: 23 °C Humidity: 53 % RH Atmospheric Pressure: 99.2 kPa
Test mode: Charging mode

Test Setup and Procedure
For AC port



1. The EUT was placed on an insulating support of 0.1m height above a ground reference Plane, arranged and connected to satisfy its functional requirement. All cables exiting the EUT was supported at a height of at least 30 mm above the ground reference plane.
2. The coupling and decoupling devices were required, they were located between 0,1 m and 0,3 m from the EUT. This distance was to be measured horizontally from the projection of the EUT on to the ground reference plane to the coupling and decoupling device.
3. Each AE, used with clamp injection, shall be placed on an insulating support 0,1 m above the ground reference plane. A decoupling network shall be installed on each cable between the EUT and AE except the cable under test. All cables connected to each AE, other than those being connected to the EUT, shall be provided with decoupling networks. The decoupling networks connected to each AE (except those on cables between the EUT and AE) shall be applied no further than 0,3 m from the AE. The cable(s) between the AE and the decoupling network (s) or in between the AE and the injection clamp shall not be bundled nor wrapped and shall be kept between 30 mm and 50 mm above the ground reference plane.
4. The frequency range was swept from 150 kHz to 80 MHz, using the signal levels established during the setting process, and with the disturbance signal 80% amplitude modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or to change coupling devices as necessary. Where the frequency was swept incrementally, the step size do not exceed 1% of the preceding frequency value. The dwell time of the amplitude modulated carrier at each frequency was not less than the time necessary for the EUT to be exercised and to respond, and was not less than 0.5 s.

Test Results:
AC Port:

Frequency	Line	Test Level	Modulation	Step Size	Dwell Time	Test Mode	Observation (Performance Criterion)
150 kHz to 230 MHz	3 Wires Supply Cable	3V r.m.s	80%, 1 kHz Amp. Mod.	1%	3s	Charging mode	No Loss of Function (A)

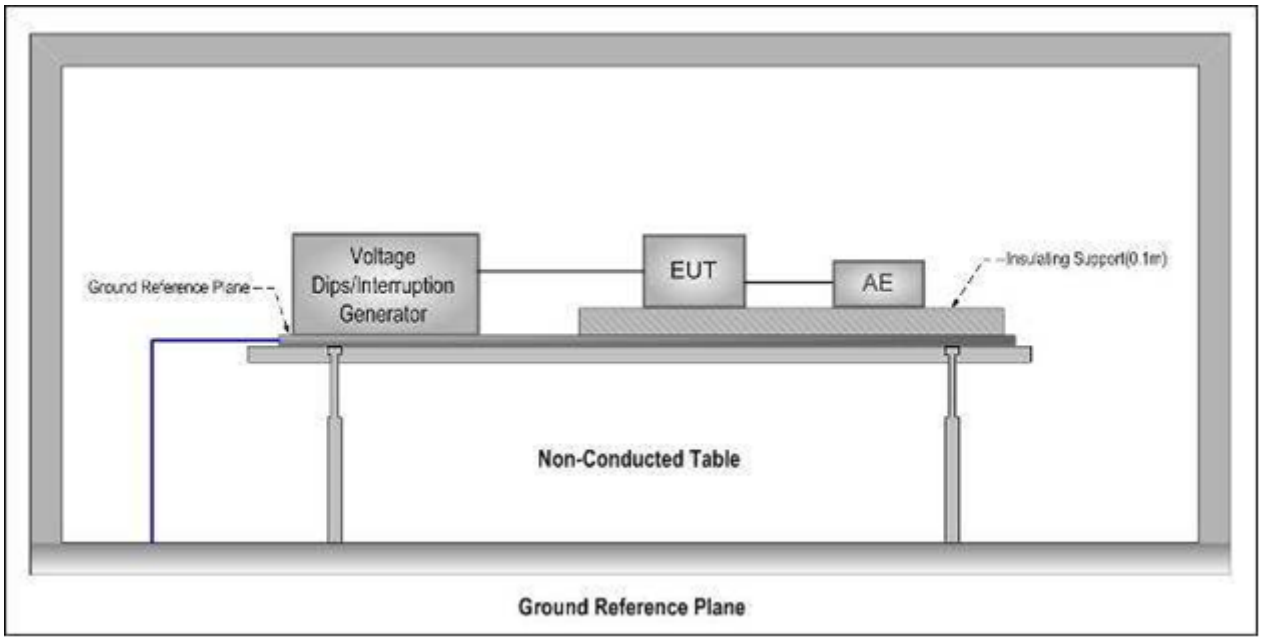
Voltage Dips and Interruptions

Test Requirement: EN 15194:2017
Test Method: EN 61000-4-11
Test voltage: Refer to UT
Test Level: For 50Hz
0% of UT (Supply Voltage) for 0.5 Periods
40 % of UT (Supply Voltage) for 10 Periods
70 % of UT (Supply Voltage) for 25 Periods
For 60Hz
0% of UT (Supply Voltage) for 0.5 Seconds
40 % of UT (Supply Voltage) for 12 Periods
70 % of UT (Supply Voltage) for 30 Periods
No. of Dips / Interruptions: 6 per Level

E.U.T. Operation

Operating Environment:
Temperature: 23 °C Humidity: 56 % RH Atmospheric Pressure: 101.1 kPa
Test mode: Charging mode

Test Setup and Procedure



1. The EUT was placed on a ground reference plane (GRP) insulated by an insulating support 0,1 m thick and the GRP was placed on a 0.8m high wooden table for table-top equipment. For floor standing equipment, the EUT was placed on a 0.1m high wooden support above the GRP.
2. The test was performed with the EUT connected to the test generator with the shortest power supply cable as specified by the EUT manufacturer.
3. The EUT was tested for each selected combination of test level and duration with a sequence of three dips /interruptions with intervals of 10 s minimum. Each representative mode of operation was tested.
4. For EUT with more than one power cord, each power cord was tested individually.

Test Results
UT= AC 100V & AC 240V
For 50Hz

Test Level % UT	Phase	Duration of drop out in Periods	No of drop out	Time between drop out	Test Mode	OBSERVATIONS (PERFORMANCE CRITERION)
0	0°	0.5	3	10s	Charging mode	(C)
40	0°	10	3	10s		(B)
70	0°	25	3	10s		(B)

UT= AC 100V & AC 240V
For 60Hz

70	0°	25	3	10s		(B)
Test Level % UT	Phase	Duration of drop out in Periods	No of drop out	Time between drop out	Test Mode	OBSERVATIONS (PERFORMANCE CRITERION)
0	0°	0.5	3	10s		(C)
40	0°	12	3	10s	Charging mode	(B)
70	0°	30	3	10s		(B)

Remark:
UT= the nominal supply voltage.
B: During test there some flick of the EUT, it could recover automatically after test.
C: The EUT can be restored by the operation of the controls, or by any operation specified in the instructions for use.

Performance C is within the acceptable criterion for Voltage Dips and Interruption test.

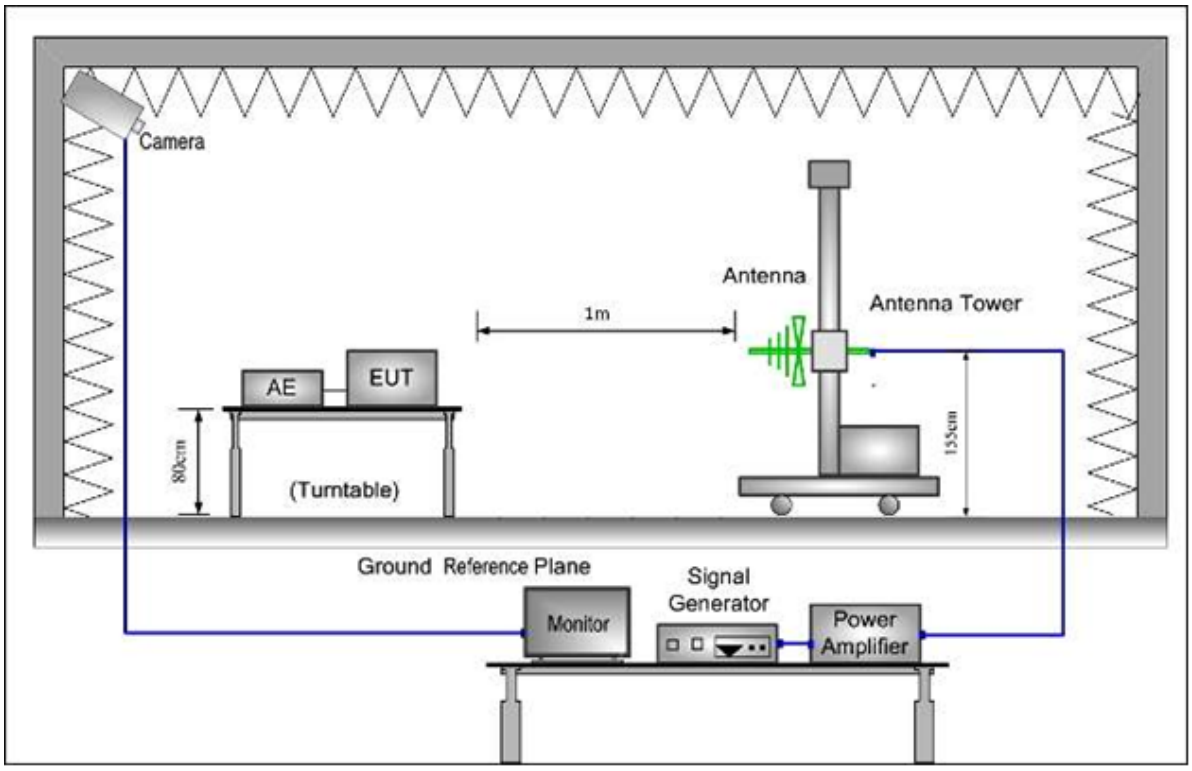
Absorber line Chamber

Test Requirement:	EN 15194:2017
Test Method:	ISO 11452-2: 2004
Power Supply:	DC 54.6V
Frequency Range:	20MHz to 2 GHz
Antenna Polarization:	Vertical
Test level:	24V/m on enclosure
Modulation:	80%, 1 kHz Amplitude Modulation

E.U.T. Operation

Operating Environment:
Temperature: 23.0 °C Humidity: 36 %RH Atmospheric Pressure: 102.8 kPa
Test mode: Running mode & Standby mode

Test Setup and Procedure



1. For table-top equipment, the EUT was placed in the chamber on a non-conductive table 0.8m high. For arrangement of floor-standing equipment, the EUT was mounted on a non-conductive support 0.1m above the supporting plane. For human body-mounted equipment, the EUT may be tested in the same manner as table top items.
2. If possible, a minimum of 1 m of cable is exposed to the electromagnetic field. Excess length of cables interconnecting units of the EUT shall be bundled low-inductively in the approximate center of the cable to form a bundle 30 cm to 40 cm in length.
3. The EUT was initially placed with one face coincident with the calibration plane. The EUT face being illuminated was contained within the UFA (Uniform Field Area).
4. The frequency ranges to be considered were swept with the signal modulated and pausing to adjust the RF signal level or to switch oscillators and antennas as necessary. Here the frequency range was swept incrementally, the step size was not exceed 1% of the preceding frequency value.
5. The dwell time of the amplitude modulated carrier at each frequency was not be less than the time necessary for the EUT to be exercised and to respond, and was not less than 0.5 s.
6. The test normally was performed with the generating antenna facing each side of the EUT.
7. The polarization of the field generated by each antenna necessitates testing each selected side twice, once with the antenna positioned vertically.
8. The EUT was performed in a configuration to actual installation conditions, a video camera and/or an audio monitor were used to monitor the performance of the EUT.
9. For table-top equipment, the EUT was placed in the chamber on a non-conductive table 0.8m high. For arrangement of floor-standing equipment, the EUT was mounted on a non-conductive support 0.1m above the supporting plane. For human body-mounted equipment, the EUT may be tested in the same manner as table top items.
10. If possible, a minimum of 1 m of cable is exposed to the electromagnetic field. Excess length of cables interconnecting units of the EUT shall be bundled low-inductively in the approximate center of the cable to form a bundle 30 cm to 40 cm in length.
11. The EUT was initially placed with one face coincident with the calibration plane. The EUT face being illuminated was contained within the UFA (Uniform Field Area).
12. The frequency ranges to be considered were swept with the signal modulated and pausing to adjust the RF signal level or to switch oscillators and antennas as necessary. Here the frequency range was

swept incrementally, the step size was not exceed 1% of the preceding frequency value.
13. The dwell time of the amplitude modulated carrier at each frequency was not be less than the time necessary for the EUT to be exercised and to respond, and was not less than 0.5 s.
14. The test normally was performed with the generating antenna facing each side of the EUT.
15. The polarization of the field generated by each antenna necessitates testing each selected side twice, once with the antenna positioned vertically and again with the antenna positioned horizontally.
16. The EUT was performed in a configuration to actual installation conditions, a video camera and/or a audio monitor were used to monitor the performance of the EUT.

Test Results

Frequency	Level	Modulation	Test Mode	Antenna Polarization	EUT Face	Result / Observations
20MHz to 2 GHz	24V/m	1 kHz, 80% Amp. Mod, 1 % increment	Running mode& Standby mode	V	Front	A
						A
				V	Rear	A
						A
				V	Left	A
						A
				V	Right	A
						A
				V	Top	N/A
						N/A
				V	Bottom	N/A
						N/A

Remarks:
Front: the front of the EUT faces to transmitting antenna (refer to Radiated Immunity test setup photo)
A: During test, no degradation in the performance of the EUT was observed; After test, no degradation in the performance of the EUT was observed.
N/A: Not applicable.
The EUT does meet the Radiated Immunity requirements of Standard.

Radiated Immunity

Test Requirement: EN 15194:2017
Test Method: ISO 11451-1:2001
Frequency Range: 20MHz to 2 GHz
Antenna Polarization: Vertical/ Horizontal
Test level: 24V/m on enclosure
Modulation: 80%, 1 kHz Amplitude Modulation

E.U.T. Operation

Operating Environment:
Temperature: 23.5 °C Humidity: 51.2 %RH Atmospheric Pressure: 101.1 kPa
Test mode: Running mode & 90% start up assistance mode & 90% maximum assistance speed mode & Standstill mode

General information:

Electric motor maximum continuous rated power	:	250 W
Cut off speed	:	25 km/h
General model for present market of the battery	:	48 V
Nominal voltage of the battery	:	48 V
Nominal capacity of the battery	:	15Ah
Recommended charging period of the battery	:	4-6 h
Maximum saddle height	:	1.2m
Wheel	:	27.5”
Fork	:	Shock absorption front fork
Load capacity of the luggage carrier	:	No back hanger

ESA List:

Object/Part No.	Manufacturer/ Trademark	Type/Model	Technical Data
Battery	Taiwan Poly Electronics Co. LTD	18650	48V15Ah
Motor	Shenghao Co., LTD	DGWH2S	48V; 250W
Charger	COMING DATA	CP546200	54.6V*2A
Controller	Nanjing Lishui Electronics Research Institute Co., Ltd / Li Dian	LSW-860（63-25F）	48V
Electronic Console	Tianjin Curtis Technology Co., Ltd/ KEY DISP	KD580	48V
Power Assist Sensor	Tianjin Curtis Technology Co., Ltd/ KEY DISP	KD-2PS-L	48V
Wiring	JingHua Baming Electronic Technology Co.Ltd/ Baming	4V4	4V4

Photo

Fig.01

Fig.02

End of Report